गुरू घासीदास विश्वविद्यालय (म्रेन किरीका अभिम 200 ह 25 ने लंग साहित नेडेर किरीका) कोनी, बिलासपुर - 495009 (छ.ग.)



Guru Ghasidas Vishwavidyalaya (A Central University Established by the Central Universities Ant 2009 No. 25 of 2009) Koni, Bilaspur – 495009 (C.G.)

List of Revised Courses

Department		Pure and Applied Physics					
Program Name : Pre Ph.D (Electronics)							
Academic Year : <mark>2016-17</mark>							
List of Revised Courses							
Sr. No.	Course Code	Name of the Course					
01							
01.		Research Methodology & Computer Applications					
02.		Research Methodology & Computer Applications Basic Electronic instrumentation & Electronic material characterization					

गुरु घासीदास विश्वविद्यालय (म्रेर विसविकार अभिम 2009 ह. 25 के संगंत साहित केईर विसविका) कोनी, बिलासपुर - 495009 (छ.ग.)



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Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2016-17

School	: School of Physical Sciences
Department	: Pure and Applied Physics
Date and Time	e : : December 12, 2016 - 11:30 AM
Venue	: Smart Class Room

The scheduled meetings of member of Board of Studies (BoS) of Department of Pure and Applied Physics, School of Studies of Physical Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur, were held to design and discuss the Pre Ph.D. (Electronics), scheme and syllabi.

The following members were present in the meeting:

- 1. Dr. R. P. Prajapati
- 2. Dr. M. N. Tripathi
- 3. Dr. R. K. Pandey
- 4. Dr. Parijat Thakur
- 5. Dr. H. S. Tewari
- 6. Prof. D. P. Ojha
- 7. Prof. P. K. Bajpai

The committee discussed and approved the scheme and syllabi. The following courses were introduced in the Pre Ph.D. (Electronics):

- Research Methodology & Computer Applications
- Basic Electronic instrumentation & Electronic material characterization
- Electronic materials and devices

Signature & Seal of HoD

गुरू घासीदास विश्वविद्यालय (न्द्रेश विश्वविद्यालय अभिम 2009 इ. 25 ने संगंध साथि नेद्रेश विनवेखनः) कोनी, बिलासपुर - 495009 (छ.ग.)



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Scheme and Syllabus

Course Structure Pre Ph.D. Physics Syllabus 2016-17

Course Code	level	Course name	Credit	Remarks
	School level	Research Methodology&	04	Common to all
		Computer Applications		
	Department level	Basic Electronic	04	Common to
		instrumentation & Electronic		Physics
		material characterization		Candidates
	Paper –III	Electronic materials and	04	Any course
	Special Paper	devices		

w.e.f. 2016-17



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Paper I Research Methodology & Computer applications

Objective- • To acquaint the research scholars with the nature, scope and limitations of various methods of conducing educational research. • To develop an understanding of process of conducting educational research. • To develop an ability of appropriate selection, development and use of various tools of research

Mode of study includes: Assigning the topic to students based on their basic background and presentation in the form of seminar which will be followed by discussion and submission of the write-up. This will be evaluated by group of teachers.

Unit 1: Research methodology

Definition of Research, Components of Research Problem, Various Steps in Scientific Research : Hypotheses, Research Purposes, Research Design, Literature searching Literature Survey, defining the question and formulating hypothesis/ hypothesizes, Collection of research data, tabulating and cataloging.Sampling and methods of data analysis.

Unit 2: Errors in measurements and statistical methods:

Types of errors; mean deviation, standard deviation and probable errors; propagation of errors with summation, difference, product and quotient Probability Theories - Conditional Probability, Poisson Distribution, Binomial Distribution and Properties of Normal Distributions, Estimates of Means and Proportions; Chi-Square Test, Association of Attributes - t-Test - Standard deviation - Co-efficient of variations. Correlation and Regression Analysis, plotting of graphs.

Unit3: Laboratory practices and safety guidelines:

Safe working procedure and protective environment, Laboratory safety measures, Handling radiation, Chemical hazards and their types, Safe chemical use, Proper storage and disposal of hazardous materials, Bio-hazardous and other toxic experimental materials, Maintenance of equipments.

Unit 4: Computer applications in scientific writing skills

Applications of Microsoft Excel, power point and origin for data processing and data analysis, research paper – presentation using power point (which include texts, graphs, pictures, tables, references etc.) (oral in power point/poster);

Curve fitting, Method of least square fit, least square fit (straight line) to linear equations and equation reducible to linear equations. Non-linear curve fitting, back ground correction and mathematical manipulation in data using origin.

Structure and Components of Research Report, Types of Report: research papers, thesis, ResearchProject Reports, Pictures and Graphs, citation styles, writing manuscript in Latex, Steps to better writing,

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Unit 5: Ethics in Science:

The source of ethical issues in science: examples from different disciplines. Ethical issues in science research and reporting: objectivity and integrity, the problem of plagiarism and related issues, international norms and standards. Scientific temper and virtues, expectations from scientific community.

IPR and Patent regime: Recording and storage/retention of recorded materials. Management and useresponsibilities in proper utilization of the facilities. Socio-legal issues, originality

Outcomes - Research methods courses offer students the opportunity to learn the various aspects of the research process, framing useful research questions, research design, data collection, analysis, writing and presentation.

References:

- 1. "How to write and Publish" by Robert A. Day and Barbara Gastel, (Cambridge University Press).
- 2. "Survival skills for Scientists" by Federico Rosei and Tudor Johnson, (Imperial College Press).
- 3. "How to Research" by Loraine Blaxter, Christina Hughes and Malcum Tight, (Viva Books).
- 4. "Probability and Statistics for Engineers and Scientists" by Sheldon Ross, (Elsevier Academic Press).
- 5. "The Craft of Scientific Writing" by Michael Alley, (Springer).
- 6. "A Students's Guide to Methodology" by Peter Clough and Cathy Nutbrown, (Sage Publications).

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गुरू घासीदास विश्वविद्यालय

(केंद्रीय किसीवल्य अधिमम 2009 ह. 25 वे संतर्भत खागित केंद्रीय किसीवल्य) कोनी, बिलासपुर -- 495009 (छ.ग.)



Guru Ghasidas Vishwavidyalaya

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Paper II

Basic Electronic instrumentation and electronic material characterization

Objective- This course will introduce the students to the recent trends in various domains of Electronics Engineering. By the end of the course, the student will be able to decide the major research area of his/her interest.

Unit I (RKP)

Semiconductor devices, diodes, junctions, transistors, field effect devices, homo and heterojunction devices, Optoelectronic devices including solar cells, photodetectors, and LEDs; High frequency devices

Unit II (PKB)

Operational amplifiers and their applications, Analog signal processing, Digital logic levels, Digital techniques and applications (registers, counters, comparators and similar circuits); A/D and D/A converters; Interfacing using IEE488 bus.

Unit III (SPP)

Vacuum techniques, Vacuum pumps (Rotary, Diffussion pumps, Turbo molecular pump), Vacuum gauges, Thin Film and Thick Film synthesis: Physical methods (Vacuum evaporation, sputtering (D.C. & RF), PLD, etc.), film thickness measurements

Unit IV

Transducers, transducer characteristics, selection of instrumentation transducers, transducer as an electrical element, Instrument probes, power measurements.

Unit V (TT)

Fluctuation and noise in measurement system, types of noise, noise in frequency domain, source of noise, signal to noise ratio and experimental design, signal to noise enhancement, digital correlation and autocorrelation methods.

Outcomes - At the end of course the student will be able to \bullet Design systems based on Embedded and VLSI. \bullet

Reference Books:

- 1. Fundamentals of electronics, Malvino and Leach
- 2. Physics of Semiconducting devices, S.M.Sze
- 3. Measurement, Instrumentation and Experiment design in Physics and Engineering,

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Program Revision

Criteria – I (1.1.2)

गरू घासीदास विश्वविद्यालय वानय अधिनियम 2009 क 25 के अंतर्गत स्थापित केन्द्री

कोनी, बिलासपुर - 495009 (छ.ग.)



Guru Ghasidas Vishwavidvalava

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Paper III

Electronic materials and devices

Objective - The course is designed to teach the physics behind electronic device operations and also prepare students for advanced courses in solid state and quantum electronics. The main emphasis is on the fundamental physics behind device operation.

Unit I (HST)

Linear and non linear dielectric materials, Ferroelectric, piezoelectric and electro-optic materials, composite materials, Liquid crystals, quasi-crystalline materials, hydride materials,

Unit II (PD)

Functional materials for device fabrication, sensor materials, shape memory alloys, hydrogen storage materials, solar cell fabrication and photovoltaic materials.

Unit III (TGR)

Carbon allotropes, fullerene, carbon nano tubes, graphene, graphite oxide and applications, Applications of carbon materials, Functionalization of graphene and carbon nanotubes

Unit IV (TGR)

Lithographic processes: Various types of lithographic processes, Photolithography, Electron beam lithography, Ion beam lithography, and advances in the field. Photoresists, Sensors fabrication, and FET fabrication.

Unit V

Nano machines and nano devices: Micro electromechanical systems, Nano electromechanical systems NEMS's, Carbon nanostructures, Carbon nanotube, Graphene and applications.

Outocmes -Students completing the course will be able to: (1) Calculate the electrical conductivity from the charge density and mobility (2) Calculate the charge density from the Hall coefficient

Reference Books

- 1. Dielectric relaxation in solids, A.K.Jonscher
- 2. Dielectrics and Waves, R. Von Hippel
- 3. Physics of Low dimensional semiconductors, J.H.Davies Carbon Nanotubes, Dresselhaus M.S., Dresselhaus G. and Avouris P.



Program Revision